Heat stress and other common features of Precision Livestock Farming (PLF)

Discussion between Israeli and Italian Experts

9th November 2020

10:00 – 12:30 CET

Thank you Mr. Ambassador. The existence of this bilateral agreement gives us the possibility to set, and hopefully, develop a collaboration between Israeli and Italian scientists in the borderland area of research in Precision Livestock Farming.
We are very grateful as the Embassy trusted this project and was eager to give advice about the right way to begin this adventure.
We are very grateful also to the ISRAEL-ITALY CHAMBER OF COMMERCE AND INDUSTRY, and in particular to Clelia Di Consiglio and Federica Manasse, for looking after the organization of this small webinar that, in our intentions, should represent the first step in this collaboration.

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Engineering to support wellbeing of dairy animals

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Current trends in the global milk market and the recent abolition of milk quotas have accelerated the trend of the European dairy industry towards larger farm sizes and higher-yielding animals. Dairy cows remain in focus, but there is a growing interest in other dairy species, whose milk is often directed to traditional and protected designation of origin and gourmet dairy products. The challenge for dairy farms in general is to achieve the best possible standards of animal health and welfare, together with high lactational performance and minimal environmental impact. For larger farms, this may need to be done with a much lower ratio of husbandry staff to animals. Recent engineering advances and the decreasing cost of electronic technologies has allowed the development of 'sensing solutions' that automatically collect data, such as physiological parameters, production measures and behavioural traits. Such data can potentially help the decision making process, enabling early detection of health or wellbeing problems in individual animals and hence the application of appropriate corrective husbandry practices. This review focuses on new knowledge and emerging developments in welfare biomarkers (e.g. stress and metabolic diseases), activity-based welfare assessment (e.g. oestrus and lameness detection) and sensors of temperature and pH (e.g. calving alert and rumen function) and their combination and integration into 'smart' husbandry support systems that will ensure optimum wellbeing for dairy animals and thereby maximise farm profitability. Use of novel sensors combined with new technologies for information handling and communication are expected to produce dramatic changes in traditional dairy farming systems.

I would like to spend few words to illustrate the origin of the idea.
Few of us (Maya, Ilan, Bruno Stefanon who is not speaking today but gave his support behind the curtains, and I) had the opportunity to know each other while we were participating to the COST action FA1308, named "DairyCare".
DairyCare was a 4 year researcher network that ended in March 2018. It focused on dairy animal health and welfare which has as its main objective the improvement of dairy animal wellbeing through scientific and technological advance.
The winning idea of DairyCare was to recognise that effective strategies for improving dairy animal wellbeing require collaboration across a broad range of specialist and expert skills. Therefore, DairyCare brought together scientists with very different expertises and made them to think and cooperate synergistically: Animal scientists, veterinarians, biotechnologists together with ethologists and electronic engineers and agricultural engineers.

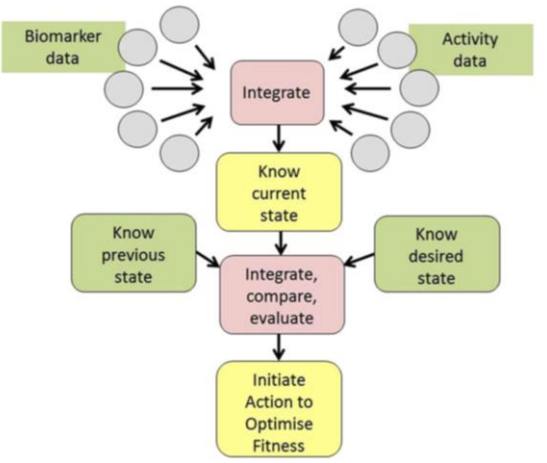
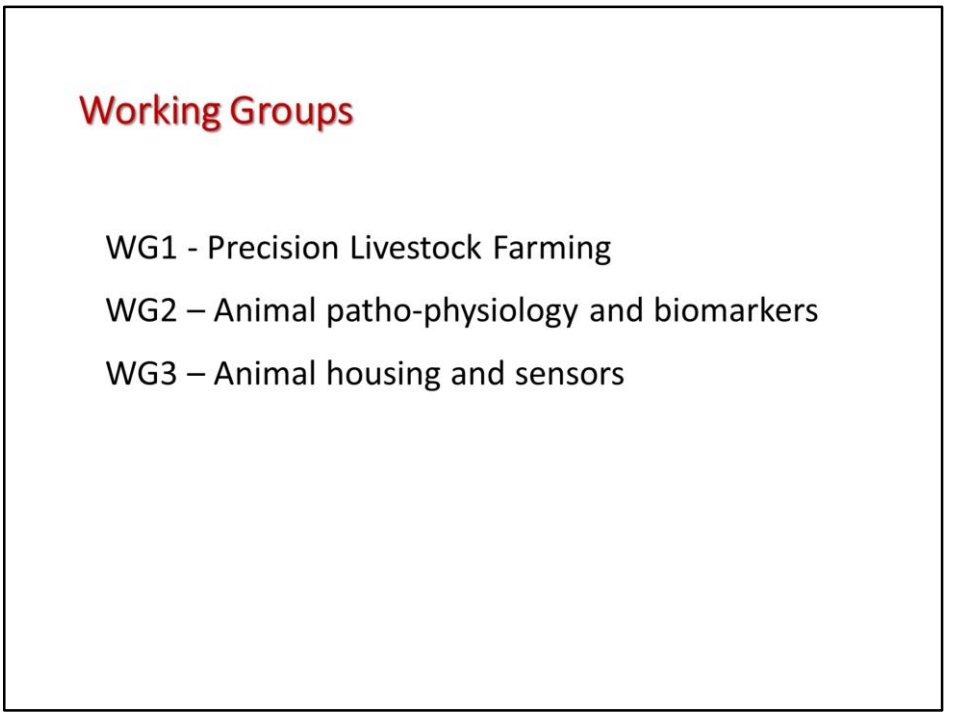
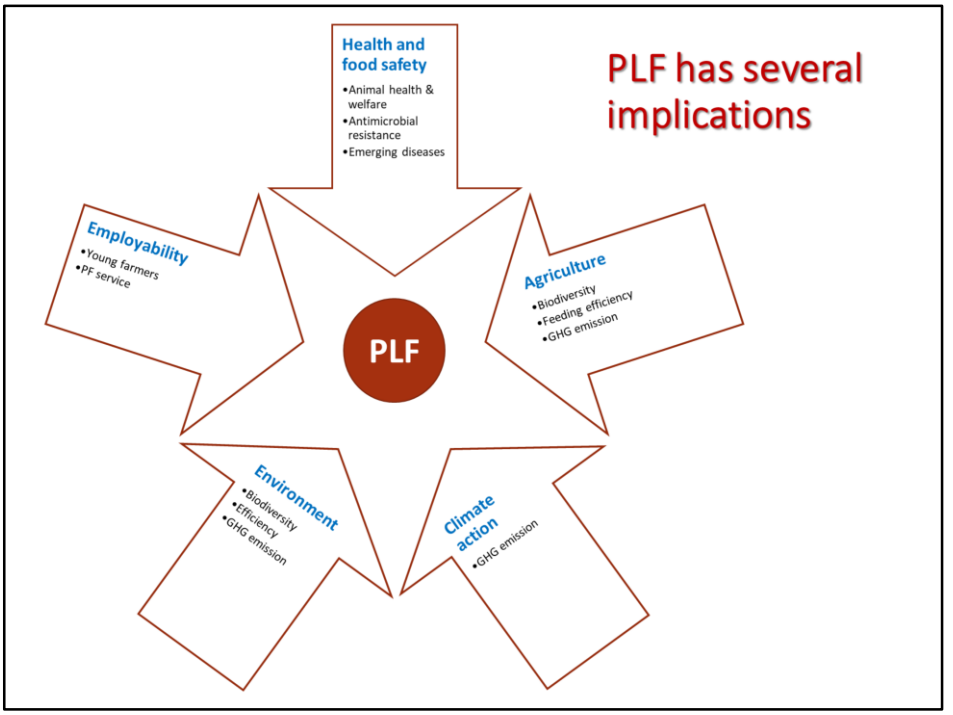


Fig. 1. The DairyCare concept. Data collected from biomarker sensors and from activity sensors are integrated to create an understanding of the cow's current status. This is compared with her own previous state and the state that is desired for a healthy cow of the same physiological stage. If the cow's status falls outside the desired range, she is flagged for action.

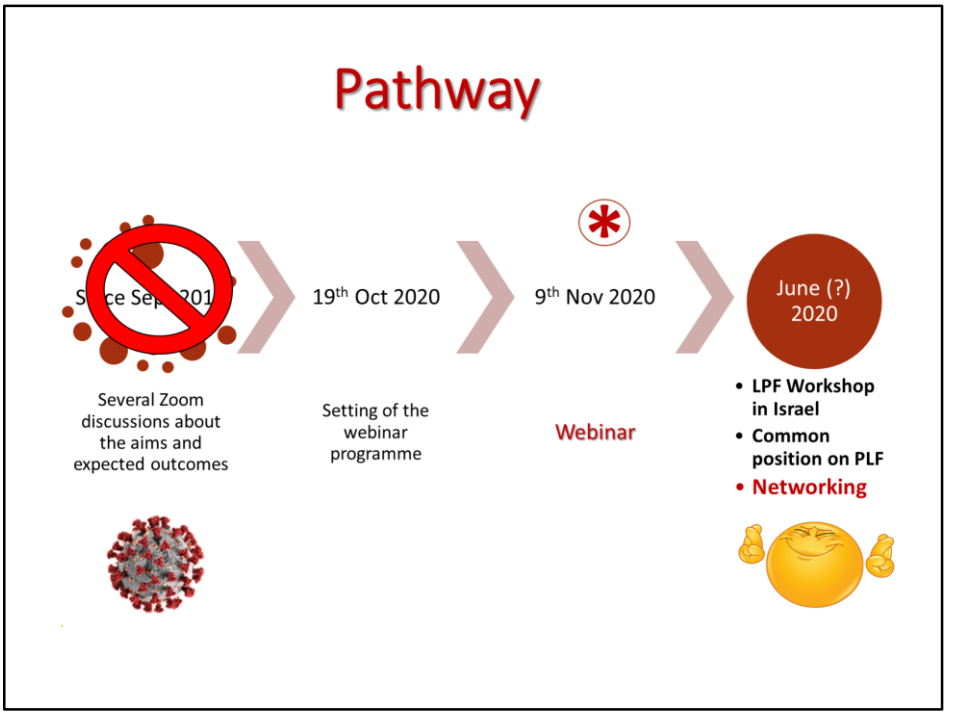
Through the combination of these skills, the biomarker and activity can be used to construct future decision support systems to assist farmers to optimise the wellbeing of their animals.



This collaboration between Israel and Italy could somehow perpetuate the DairyCare concepts. Indeed, at the end of the story, several people with different backgrounds and expertise are involved in this webinar. You can find some of them in the website. However, other colleagues were actively involved in the preparation of this webinar (even though they are not giving a talk today). I have already mentioned Bruno Stefanon, but I should mention also Matteo Barbari.
The preparation of this webinar (and hopefully the post-pandemic seminar) has been brought about by three Working Groups that can be identified in simple words as:
Working Group 1: the real PLF experts;
Working Group 2: biologists and physiologists
Working Group 3: the engineers
I am not going to say more about working groups, as they will be better described in the following talks.



Precision Livestock Farming is a complex matter with many implications. Therefore, we had to make some choices about the profile of our project. This webinar is a part of this process of focusing on our targets.



We are working on this project since before the covid pandemic, and originally we planned to hold a workshop in Tel-Aviv. As you can imagine, we had to postpone the date two or three times.
In the hope that all this awful situation would terminate soon, the decision was taken to proceed by several steps, and this webinar is an important one, as Ilan will probably point out at the end of this morning.

Concluding remarks

Please send to Ilan until 12:00

- One “highlight” from of a presentation
- One key item you like to work on
- key decisions and next steps

(by the zoom chat or by Halachmi@volcani.agri.gov.il

By the way, Please send to Ilan some tips to produce in «real time» our concluding remarks.
Everybody is invited to do so.

Aims

- Discussing the state-of-art and future development of PLF techniques
- Laying the foundation for further cooperation between IL & IT
- Involve in the discussion people from public Institutions and industry.
- Outline IL-IT common view of the role of PLF in the context of European Green Deal Agriculture.

When beginning such a collaborative project, it is mandatory to focus on the targets. This small size meeting aims to focus on common problems, interests and technologies that Israel and Italy can share and develop together, and to share of a common view of the role of PLF in the context of European Green Deal Agriculture. We chose heat stress as a case study, as global warming poses common problems to Israel and Italy, and to all Mediterranean countries I would say. Indeed, climate changes can be a real threat to animal health, productivity and product quality, if not adequately managed.

Webinar outline

WG1. Precision livestock farming. Overview of current situation	Marcella Guarino
PLF heat-stress case studies	Ilan Halachmi
WG2. Animal pathophysiology and biomarkers of heat stress in dairy cows	Maya Zachut
WG3. Improvement of livestock housing, assessment and control of thermal comfort in hot climates	Pierpaolo Martini
IT-IL collaboration opportunities	Stefano Ventura
EU Green Deal Policy	Andrea Carignani di Novoli
Current cooperation between Italy and Israel in agriculture	Gianluca Giorgi
Heat stress and animal health: One health considerations	Paolo Pasquali
The human as a reference for assessment of livestock thermal comfort	Alberto Muscio
The contribution of proteomics to animal production	Paola Roncada

Today, we have three main talks introducing the three Working Groups. The first of these lecture will be a two voices talk, actually.
Then, there are some programmed participations, which will help us to understand more the policy and the opportunities, and also the history of Israeli-Italian collaboration in the fields of farming and agriculture. We'll finish with three short "perspectives" that may add value to PLF.